THURSDAY, APRIL 23, 1914.

A TREATISE ON IGNEOUS ROCKS.

Igneous Rocks. Composition, Texture and Classification, Description and Occurrence. By Joseph P. Iddings. In Two Volumes. Vol. i. Pp. xi+464+3 plates. (1909.) Price 21*s.* net. Vol. ii. Pp. ix+685. (London: John Wiley and Sons, Inc.; London: Chapman and Hall, Ltd., 1913.) Price 25*s.* 6*d.* net.

UNIFORM with the "Rock Minerals" of the same author, now in its second edition, the work which Prof. Iddings has now completed will take an assured place as the fullest and most comprehensive treatment of the subject in our language. Nor is it of the nature of a compilation, but presents numerous features of originality. There are novelties which will be cordially welcomed, and others which will probably meet a more doubtful reception. The author has not shrunk from introducing many debatable questions, and has pronounced on them in no uncertain tone. Although the spirit is that of the missionary rather than the controversialist, this somewhat impairs the utility of the work as a hand-book for students.

The first volume, which has been for some time in the hands of petrologists, deals with the composition, texture, and classification of igneous rocks. It includes a good account of the chemical composition of the rocks and of their component minerals, a discussion of the chemistry and physics of rock-magmas, an admirable and well-illustrated chapter on rock-textures, and a statement of the problem of magmatic differentiation. The last three chapters are concerned with the thorny subject of nomenclature and classification. Here we have first a historical sketch, then an arrangement of the principal igneous rocks in a "qualitative" mineralogical scheme, and finally an exposition of the "Quantitative Classification," of which our author is one of the creators.

The second volume, recently issued, deals with the description and occurrence of the rocks, and is divided into two equal parts. The final test of any classificatory scheme is its applicability in practice; and doubtless many petrologists have waited with curiosity to see how the author would develop a systematic treatment of igneous rocks on the lines of the Quantitative Classification. It seems that we may now congratulate him on recognising the impossibility of the task, for the system actually adopted does not differ in general plan from others in current use. The rocks are first divided into those characterised by (1) preponderance of quartz, (2) quartz and felspar, (3) felspar, (4) felspar and felspathoids, (5) felspathoids, and (6) ferro-magnesian minerals. Under each head "phanerites" and "aphanites" are separated, while the subdivisions are again based on mineralogical characters. To introduce the quantitative element, the author has often redefined terms already in use (a practice which he deprecates in others); but he has succeeded in producing a working scheme with less disturbance of accepted usage than we had expected. The principal relic of the specific "Quantitative Classification" is the use of an ideal mineral composition (the "norm") instead of the actual composition.

Nevertheless, there are many signs that the author is reluctant to abandon the conception of a classification laid down *a priori*. The precise boundaries which he demands are to be fixed by arithmetic, not by chemistry. He counts it a defect of the current systems that special importance is attached to the presence of even very small amounts of certain minerals, such as nepheline and leucite; but, as he has himself pointed out (prior to the birth of the Quantitative Classification), the mere appearance of one of these minerals shows that we have crossed a significant boundary-line in respect of chemical composition. Surely it is he, not his critic, who has lost appreciation of "the mathematical precision of stochiometric chemistry" (p. 7).

The second part of the volume we can praise without reserve. It is an account, such as has never been attempted before, of the geographical distribution of igneous rocks over the globe, with special reference to their chemical composition. This has not been merely compiled in the library, but represents the results of much travel and study in many lands. It is illustrated by maps of the several continents, and by more than 1200 analyses. We hope that in another edition some attempt will be made to distinguish on the maps igneous rocks of different geological ages.

A. H.

MATHEMATICS FOR FRENCH FRESHMEN.

Les Principes de l'Analyse Mathématique: Exposé Historique et Critique. By Prof. P. Boutroux. Tome Premier. Pp. xi+547. (Paris: A. Hermann et Fils, 1914.) Price 14 francs.

PROF. BOUTROUX appears to belong to the school of the laughing philosophers; for, like many of his distinguished compatriots, he has composed a work which is amusing as well

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as learned. His six chapters range from elementary arithmetic to differential equations, and touch upon such things as friendly numbers, magic squares, the transcendency of π, Tartaglia's rhymed rule for solving a cubic, and so on. Altogether, the book is written in a light and elegant style, reminding us of Lucas; it is neither so technical, nor so critical, as its title might suggest.

Sometimes we are inclined to think that the author is poking fun; for instance (p. 50), he suggests that o (zero) is the initial letter of οὐδέν! It is scarcely necessary to say that the Greeks adopted the decimal notation, including zero and the nine other digits, after it had been invented by Eastern (probably Indian) mathematicians; and that our zero is almost certainly an enlargement of the dot which is still used by Oriental printers (unless the dot is a contraction for an older circle).

"Bernouilli," instead of Bernoulli, occurs so often that it can scarcely be condoned as a misprint; "Neper" we let pass, as a traditional misspelling; otherwise the names of authors seem to be correct. This is a small matter; a much more important fact is that the author, besides being interested in the discoveries of the ancients, is fully awake to the merits of the moderns. For instance, we have the modern definition of "function"; references to the modern theories of irrational numbers, of functional equations, and the like.

It is interesting to see from the preface that this book is intended to be a "repertorium" for "débutants en mathématiques." As a repertorium it is certainly not one of formulæ; so it must be judged as one of ideas, and since it begins with a quotation from Plato's "Republic," we may suppose that this is what the author means.

From this point of view, the author may be congratulated, because the ideas which he suggests are eternal, though the forms under which he presents them are merely those which seem for the present the most convenient and suitable. One great advantage of the historical treatment of the subject is that it shows how what we may call the machinery of the subject has been improved and simplified.

Prof. Boutroux promises us another volume dealing mainly with analytical geometry, mathematical logic, and infinitesimal calculus; it will also deal with complex quantities and series. Teachers will note that the range of the whole work approximately covers the course of general mathematics in the science faculties of the higher educational bodies in France.

G. B. M.

ANALYTICAL AND SYNTHETICAL CHEMISTRY.

(1) *Industrial Organic Analysis: for the Use of Technical and Analytical Chemists and Students.* By Paul S. Arup. With a foreword by Prof. J. C. Irvine. Pp. xii + 340. (London: J. and A. Churchill, 1913.) Price 7*s.* 6*d.* net.

(2) *A Text-book of Quantitative Chemical Analysis.* By Dr. A. C. Cumming and Dr. S. A. Kay. Pp. xi + 382. (London: Gurney and Jackson; Edinburgh: Oliver and Boyd, 1913.) Price 7*s.* 6*d.* net.

(3) *The Sugars and their Simple Derivatives.* By Dr. J. E. Mackenzie. Pp. xvi + 242. (London: Gurney and Jackson; Edinburgh: Oliver and Boyd, 1913.) Price 7*s.* 6*d.* net.

(4) *The Silicates in Chemistry and Commerce: including the Exposition of a Hexite and Pentite Theory and of a Stereo-chemical Theory of General Application.* By Dr. W. Asch and Dr. D. Asch. Translated, with critical notes and some additions, by Alfred B. Searle. Pp. xx + 456. (London: Constable and Co., Ltd., 1913.) Price 21*s.* net.

(5) *Die Elemente der siebenten Gruppe des periodischen Systems: aus Abegg's der anorganischen Chemie.* Vierter Band. Zweite Abteilung. Herausgegeben von Dr. Fr. Auerbach. Pp. x + 904. (Leipzig: S. Hirzel, 1913.) Price 26 marks.

(1) THIS volume is intended for the use of students who, having received a grounding in theoretical and practical chemistry, are desirous of gaining an insight into the methods of industrial organic analysis. Eight typical series of commercial organic products have been selected, and detailed instructions are given of the analytical processes employed in determining the industrial value of the materials under consideration. The subjects chosen include coal and coke, coal tar and its distillation products, the petroleums, the fatty oils and fats, soap, milk, butter, starch and its degradation products, flour, barley, malt, and the preservatives and colouring matters introduced into foods. One very valuable feature of the book is the references to the larger manuals and special monographs given at the end of each chapter.

In the foreword Prof. Irvine deals with the controversial topic of the college training of industrial chemists. The subject was not new thirty years ago, and although the discussion is unending there is really no general problem to be faced; still less is there any general solution to be provided. Experts differ, and the weighty opinions of Prof. Martin (*sic*) Bogert, President

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